

What is claimed is:

1. A method for cleaning a component of an air-conditioning or refrigeration system, said method comprising the following:

- 5 (a) flushing liquid solvent through the component to remove contamination from the component;
- (b) vaporizing the solvent flushed through said component in step (a);
- (c) removing contamination from said solvent vaporized in step (b) so as to clean said solvent of the contamination;
- 10 (d) liquefying said cleaned vaporized solvent;
- (e) re-using said liquefied solvent to flush said component; and
- (f) carrying out steps (a) through (e) in a continuous process.

15 2. The method of claim 1 wherein said solvent has a boiling point in the range of about 10°C to about 45°C.

3. The method of claim 1 wherein said solvent has a boiling point in the range of about 5°C to about 55°C.

20 4. The method of claim 1 wherein said solvent has a boiling point in the range of about 0°C to about 61°C.

5. The method of claim 1 wherein said solvent comprises HFC-245fa.

6. The method of claim 1 further comprising the step of:

(h) storing said cleaned liquefied solvent in a storage tank after step (d) and prior to re-use in step (e).

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7. The method of claim 6 further comprising the step of

(i) after cleaning the component, stopping steps (a), (e) and (f) while continuing with steps (b), (c), (d) and (h) to remove the solvent from the component.

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8. The method of claim 7 further comprising the step of:

(j) purging the contamination removed in step (c).

9. The method of claim 8 wherein the step (j) is carried out prior to step (i).

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10. The method of claim 1 wherein said solvent comprises a hydrofluorocarbon .

11. The method of claim 10 wherein said solvent comprises a non-flammable hydrofluorocarbon.

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12. A method for using solvent to clean a component of an air-conditioning or refrigeration system and recovering and cleaning the solvent for reuse, said method comprising the following steps:

(a) providing a source of liquid solvent;

5 (b) flushing said liquid solvent from said source through the component to be cleaned wherein said solvent may pick up contamination;

(c) evaporating the liquid solvent that has exited said component after step (b) so that said solvent becomes gaseous;

10 (d) removing said contamination from said gaseous solvent to thereby clean said solvent;

(e) compressing said gaseous solvent which has been cleaned in step (d);

(f) condensing said compressed gaseous solvent back to a liquid; and

15 (g) returning said liquid solvent to said source for reuse.

13. The method of claim 12 further comprising:

(h) after the cleaning of said component, isolating said solvent source from said component to stop solvent from entering said component; and

20 (i) continuing with steps (c) through (g) to recover any remaining solvent from the component.

14. The method of claim 12 further comprising:

(h) stopping said steps (a) through (g); and

(i) using pressure from said source of liquid solvent to forcibly purge the contamination removed in step (d).

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15. The method of claim 12 wherein step (c) is carried out by directing said solvent through an expansion valve and an evaporator.

16. The method of claim 12 wherein said solvent comprises HFC-245fa.

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17. The method of claim 12 wherein said method is an automated method.

18. The method of claim 1 wherein said solvent has a boiling point in the range of about 10°C to about 45°C.

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19. The method of claim 1 wherein said component to be cleaned is from an air-conditioning or refrigeration system that includes a hydrocarbon oil.

20. The method of claim 19 wherein said solvent includes trans-1,2 dichloroethylene.

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21. An apparatus using solvent to clean contamination from a component of an air-conditioning or refrigeration system and recovering and cleaning the solvent for reuse, said apparatus comprising the following:

a source of liquid solvent to be flushed through the component,
5 said source being fluidly connectable to said component to deliver the solvent thereto;

an expansion valve for receiving the solvent after it is flushed through the component, said expansion valve being fluidly connectable to said component to receive the solvent there from;

10 an evaporator fluidly connected to said expansion valve for receiving the solvent that has exited the expansion valve and vaporizing the solvent;

a separator fluidly connected to said evaporator for removing said contamination from said vaporized solvent and thereby clean said
15 solvent;

a compressor fluidly connected to said separator for compressing said vaporized solvent;

a condenser fluidly connected to said compressor for condensing said solvent back to a liquid, said condenser being fluidly connectable to
20 said source of liquid solvent to return said solvent thereto.

22. The apparatus of claim 21 further comprising a fluid conduit connecting a vapor space in said source of liquid solvent to said separator so as to be

capable of providing pressure from said source to said separator to purge contamination from said separator.

23. The apparatus of claim 21 wherein said apparatus is configured to
5 operate with a solvent comprising a hydrofluorocarbon and having a
boiling temperature in the range of about 0°C to about 61°C.

24. The apparatus of claim 23 wherein said elements are configured to
operate with solvent having a boiling temperature in the range of about
10 10°C to about 45°C.

25. The apparatus of claim 21 further comprising a bypass fluid conduit and
valve configured to allow bypass of the solvent around the expansion
valve.

26. The method of claim 12 wherein said solvent comprises a
hydrofluorocarbon.

27. The method of claim 26 wherein said solvent comprises a
20 hydrofluorocarbon and is non-flammable.